REMARKS

Present Status of Patent Application

Claims 1-23 remain pending, of which claims 1, 6, 10 and 21-23 have been amended. Further, Applicants have amended the drawings. It is believed that no new matter adds by way of these amendments made to claims, drawings or otherwise to the application. For at least for the following reasons, Applicants respectfully submit that all pending claims 1-23 are in proper condition for allowance. Reconsideration is respectfully requested.

Response to Objections to Drawings

1. The Office Action objected to the drawings because Figures 1-4 should be designated by a legend such as -Prior Art—because only that which is old is illustrated.

In response thereto, Applicants would like to thank the Examiner for pointing out the informality and accordingly amended Figures 1-4 as shown in red ink to include the legend "Prior Art". Further, Applicants respectfully submit that upon allowance of this application, a corrected formal drawing will be submitted. Reconsideration is respectfully requested.

Response to Claim Objection

2. The Office Action objected to claims 6 and 10 because of the following informalities: Misspelling: Claims 6 and 10, line 2: replace "each vertices" by -each vertex—; replace "simplification" by -simplification—(claim 6. Appropriate correction is required.

In response thereto, Applicants would like to thank the Examiner for pointing out the informality and accordingly amended claims 6 and 10. Reconsideration is respectfully requested.

Response to Claims Rejections under 35 USC§103

3. The Office Action rejected claims 1-5 and 12-23 under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US-6,262,737, hereinafter Li) in view of Hoppe et al. (US-6,046,744, hereinafter Hoppe).

Applicants respectfully disagree and respectfully submit that independent claim 1 is allowable for at least the reason that both Li and Hoppe substantially fails to teach, suggest or disclose every features of the claimed invention. More specifically, both Li

and Hoppe substantially fails to teach suggest or disclose a method of constructing progressive mesh comprising at least:

"constructing a cluster from ea h vertex in a single resolution mesh constituted of a plurality of vertices, constructing n expansion operation by connecting the vertex with its adjacent vertices, and calculatin a cost of the expansion operation, wherein said vertices comprises two or more than two vertices;

repeating the expansion operati n with the lowest cost for constructing a forest, wherein the expansion operation (i, j, k) with the lowest cost is performed, with i, j, k as vertices in the mesh, vertex k as a root of the cluster after the connection until the first termination condition is fulfilled; and

performing a clustering simplif cation to each cluster c(t) in the forest above, merging non-root vertices to t in a singl step, wherein t is a representative vertex of the cluster c(t), as required by the amended laim 1."

The advantage of the foregoing steps is that unlike the edge collapsing method, the clustering of a single cell cluster can be accomplished in a single operation step regardless of number of vertices but also the geometric properties and attributes of the mesh, and data and errors in each layer of the resolution, can be retained allowing the vertex clustering to be reversible so that refining or coarsening of the mesh can be achieved in real time. Therefore, in a distributed virtual environment, the mesh can be transmitted to a customer through a data network and all kinds of resolution processing can be executed without requiring additional hardware. Further, the progressive

algorithm produced by the present invention can increase arbitrary amount of triangles in one refinement iteration according to the settings of mesh simplification, and therefore the efficiency of refinement is much higher than the edge-collapsing algorithm and is suitable for real time rendering virtual reality.

To the contrary, Li substantially teaches a conventional method of compressing a 3D polyhedral meshes comprising the combination of progressive meshing technique and edge collapsing technique. In other words, Li substantially fails to teach, suggest or disclose performing an expansion operation for growing a forest and then performing a clustering simplification operation for clustering each cluster cells in a single operation step, as required by Claim 1, instead Li substantially teaches a progressive meshing method employing the edge-collapsing algorithm. Accordingly, Li's progressive meshing method employing the edge-collapsing algorithm can remove at most two triangles from the mesh at a time. Although edge-collapsing algorithm has fine meshing power and can retain characteristics of the original mesh, removing or increasing two triangles at a time is too slow. For example, for simplifying a mesh composed from 8828 triangles to a mesh with 500 triangles, at least (8828-500)/2 = 4164 edge-collapsing steps have to be carried out. Consequently, the method is unsuitable for real time rendering or image transformation requiring rapid vertex and triangle deletion. Accordingly, Applicants respectfully submit that Li cannot possibly meet Claim 1 in this regard, and therefore should be allowed.

Further, because the Office Action relied upon Hoppe to show lowest cost

estimation of an edge collapse operation, and therefore Hoppe still cannot cure the specific deficiencies of Li for reasons as substantially discussed above. Accordingly, Applicants respectfully submit that combination of Li and Hoppe cannot possibly render the claim 1 obvious in this regard and therefore should be allowed. Reconsideration is respectfully requested.

For at least the foregoing reasons, claims 1-5 and 12-23 patently define over Li and Hoppe. Reconsideration and withdrawal of these rejections is respectfully requested.

4. The Office Action rejected claims 6-11 under 35 U.S.C. 103(a) as being unpatentable over Li in view of Hoppe and further in view of Taubin et al. (Progressive Forest Split Compression", IBM T. J. Watson Research Center, ACM, Published July 1998, pages 1-10, hereafter Taubin)

Applicants respectfully disagree and would like to point out that claims 6-11 depend from claim 1, and because like Li (and Hoppe), Taubin also substantially discloses a conventional method of compressing a 3D polyhedral meshes comprising the combination of progressive meshing technique and edge collapsing technique, wherein only vertices of two adjacent triangle are connected at a time and repeated for forming a forest collapse operation. Accordingly, Applicants respectfully submit that Tauber still cannot cure the specific deficiencies of Li and Hoppe in this regard. Therefore, Applicants respectfully submit that claim 6-11 also patently define over Li, Hoppe and Tauber for at least the same reason as set forth above. Reconsideration is respectfully requested.

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CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 1-23 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

Respectfully submitted,
J.C. PATENTS

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Jiawei Huang
Registration No. 43,330

4 Venture, Suite 250
Irvine, CA 92618
Tel.: (949) 660-0761
Fax: (949) 660-0809